

1995-119492

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N95-25912

APPENDIX A

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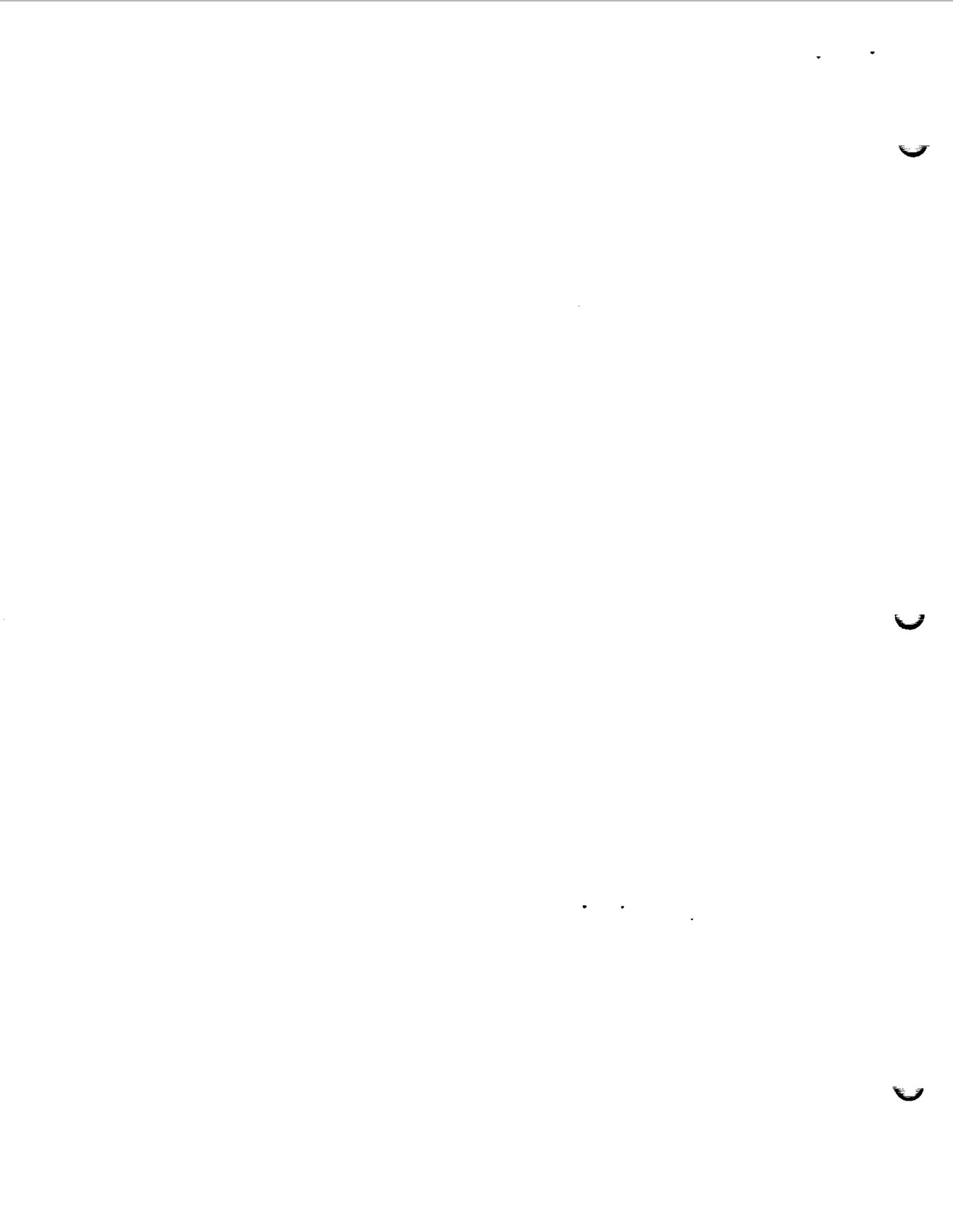
LET SPECTRA MEASUREMENTS FROM THE STS-35 CPDs

p. 6

LET spectra derived from ATAS track parameter measurements for CPDs flown with the astronauts on STS-35 are plotted in Figures 1, 2 and 3. Figure 1 shows the total particle flux spectra for $LET_{H_2O} \geq 5 \text{ keV}/\mu\text{m}$. The spread between the seven individual spectra is typical of past manual measurements of sets of CPDs. This difference is probably due to the cumulative net shielding variations experienced by the CPDs as the astronauts carrying them went about their activities on the Space Shuttle. The STS-35 mission was launched on Dec. 2, 1990, at 28.5° inclination and 352 km altitude. This is somewhat higher than the nominal 300-km flights and the orbit intersects more of the high intensity trapped proton region in the South Atlantic Anomaly (SAA). However, in comparing with APD spectra measured on earlier lower altitude missions (STS-26, -29, -30, -32) the flux spectra are all roughly comparable. This may be due to the fact that the STS-35 mission took place close to solar maximum (Feb. 1990), or perhaps to shielding differences.

The corresponding dose and dose equivalent spectra for this mission are shown in Figures 2 and 3. The effect of statistical fluctuations at the higher LET values, where track densities are small, is very noticeable. This results in an increased spread within the dose rate and dose equivalent rate spectra, as compared to the flux spectra. The contribution to dose and dose equivalent per measured track is much greater in the high LET region and the differences, though numerically small, are heavily weighted in the integral spectra. The optimum measurement and characterization of the high LET tails of the spectra represent an important part of the research into PNTD response.

Table 1 gives the integral flux, dose rate, dose equivalent rate and mission dose equivalent for the seven astronauts. Flux is



2.87 ± 0.34 × 10⁻⁴ particles/cm²·s·sr, dose rate is 0.755 ± 0.060 mrad/d and dose equivalent rate is 5.41 ± 0.67 mrem/d (for LET_w·H₂O >5 keV/μm) for the CPDs. These numbers are in the range expected for low altitude, low inclination orbits.

TABLE A1. PNTD Measurements for the Crew Passive Dosimeters on STS-35

<u>CPD</u>	<u>Flux</u> <u>(cm⁻²s⁻¹sr⁻¹)</u>	<u>Absorbed</u> <u>Dose Rate</u> <u>(mrad d⁻¹)</u>	<u>Dose Equiv.</u> <u>Rate</u> <u>(mrem d⁻¹)</u>	<u>Total Dose</u> <u>Equiv.</u> <u>(mrem)</u>
3501	3.00 e-04	0.832	6.11	54.9
3502	2.92 e-04	0.761	5.29	47.6
3503	2.91 e-04	0.705	4.82	43.3
3504	2.54 e-04	0.743	6.01	54.0
3505	2.28 e-04	0.685	5.20	46.8
3506	3.06 e-04	0.839	6.03	54.2
3507	3.42 e-04	0.718	4.39	39.5

(for LET_w·H₂O >5 keV μm⁻¹)

The accuracy of the measurements is affected by counting statistics, track parameter measurement errors, stability and homogeneity of response of the PNTDs. Calibrations indicate σ of approximately ± 10%.

FIGURE CAPTIONS

Fig. A1. LET total flux spectra for seven CPDs on the STS-35 mission.

Fig. A2. LET dose rate spectra for seven CPDs on the STS-35 mission.

Fig. A3. LET dose equivalent rate spectra for seven CPDs on the STS-35 mission.

INTEGRAL LET-SPECTRA (FLUX)

STS-35

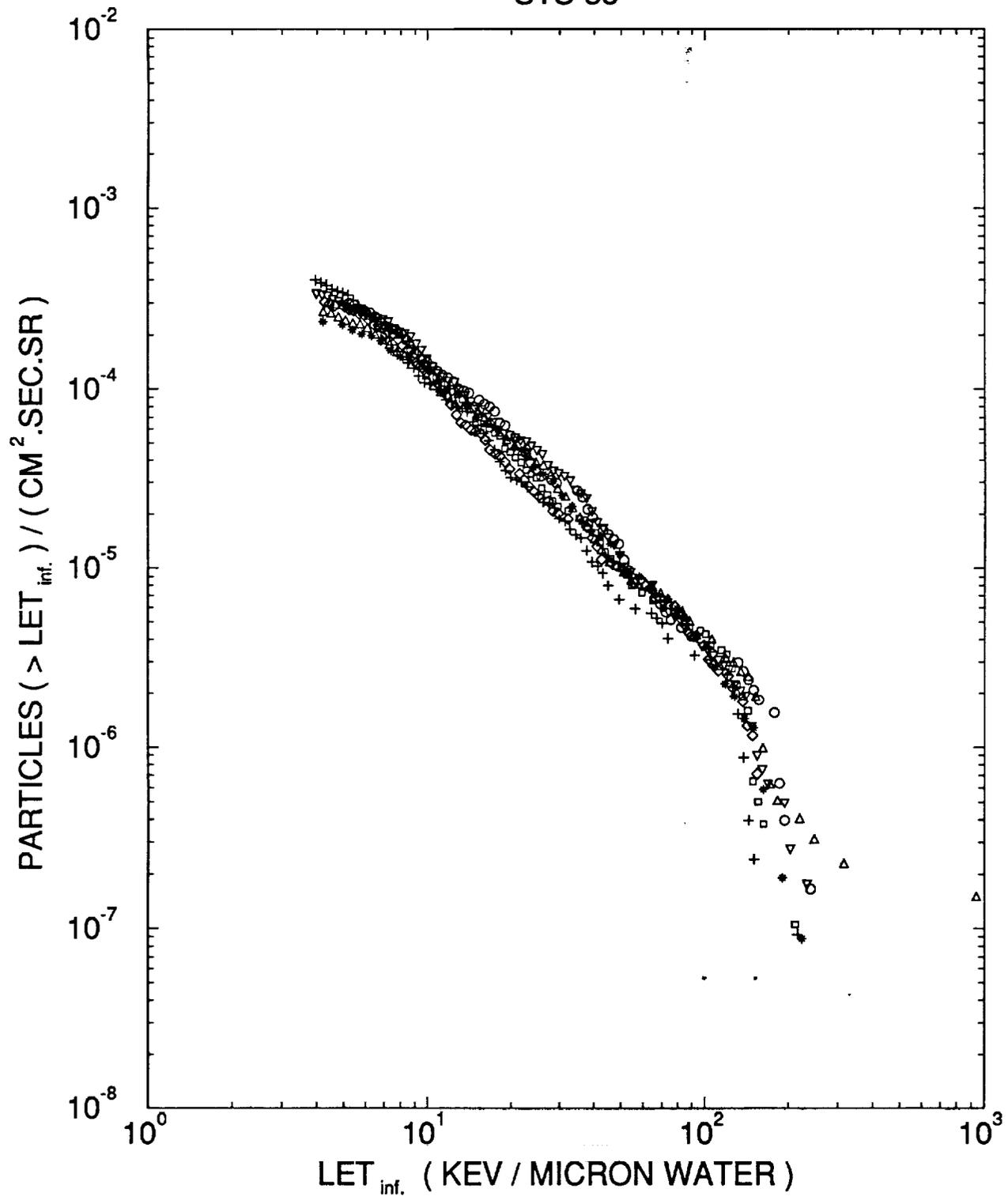


FIGURE A1

DOSE RATE SPECTRA

STS-35

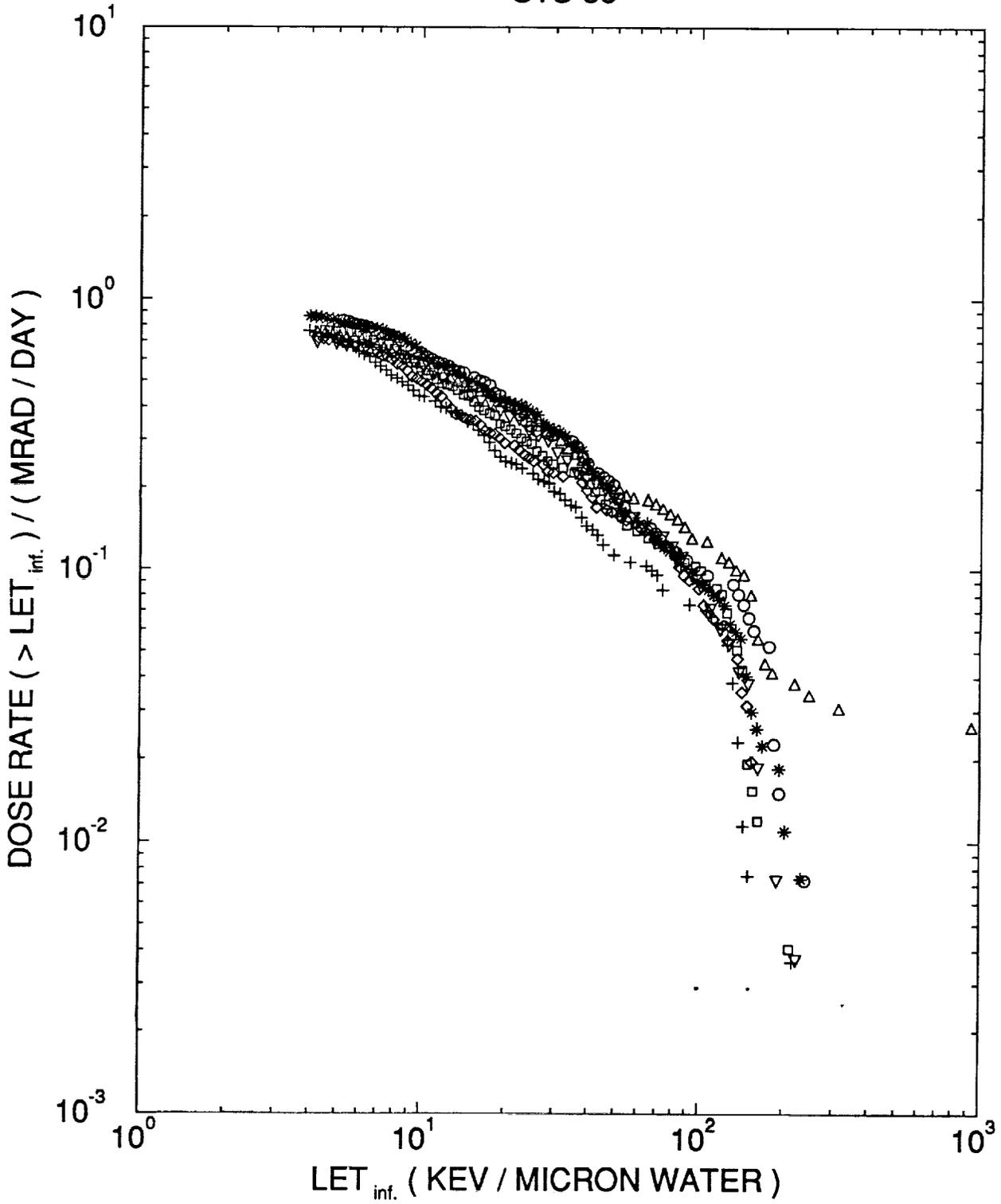


FIGURE A2

DOSE EQUIVALENT RATE SPECTRA

STS-35

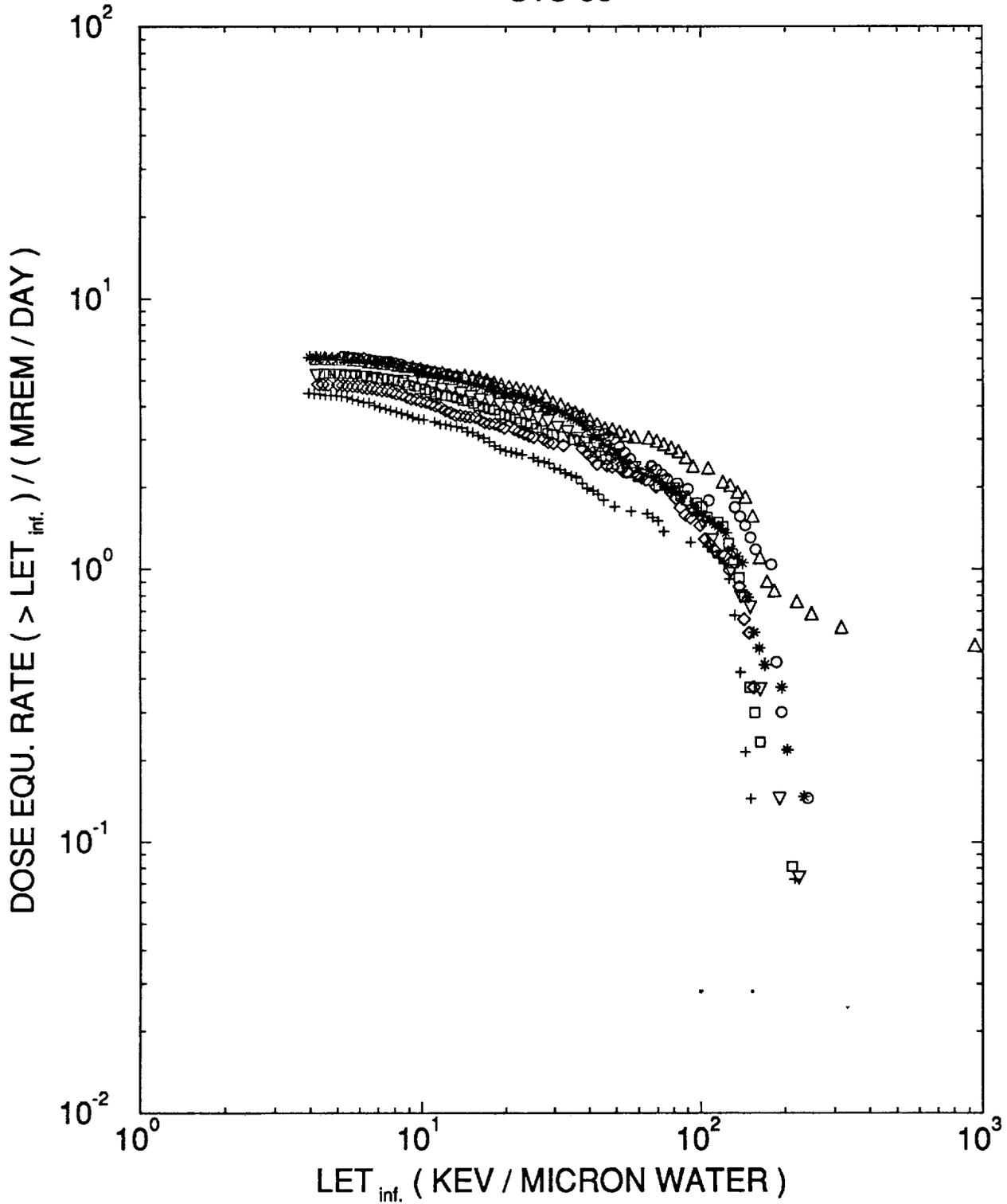


FIGURE A3

